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RESEARCH ARTICLE

Perceived risk crowds out trust? Trust and public compliance with coronavirus restrictions over the course of the pandemic

Ben Seyd^{1*}  and Feifei Bu²

¹School of Politics and International Relations, University of Kent, Canterbury, UK and ²Department of Behavioural Science and Health, University College London, London, UK

*E-mail: b.j.seyd@kent.ac.uk

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Abstract

Governments rely on citizen compliance for official rules to be effective. Yet achieving compliance is often tricky, particular when individual costs are high. Under what conditions will citizens voluntarily respect collective rules? We explore public compliance with SARS-CoV-2 (coronavirus) restrictions, focusing on the role of political trust. We anticipate that the effects of trust on compliance will be conditional on the presence of other factors, notably fear of infection. Low levels of fear may provide room for trust to shape compliance; yet high levels of fear may ‘crowd out’ the role of trust. We hypothesize that, at the pandemic’s outset, compliance was likely to be shaped more by fear than by trust. Yet as the pandemic progressed, the impact of fear on compliance was likely to have weakened, and the impact of trust to have strengthened. These hypotheses are tested using longitudinal data from Austria, Germany, and the United Kingdom.

Keywords: coronavirus; compliance; political trust; fear

Governments of all stripes – autocratic and democratic – rely on citizens to comply with official rules for these edicts to be effective. Yet achieving such compliance is often tricky, in particular where this imposes high costs on individuals. Governments can achieve popular compliance either by force, through sanctions, or by encouraging voluntary obedience. The latter, consensual, route to compliance is widely accepted to be more effective and cost-efficient than the former, coercive, route (Mulder *et al.*, 2006; Trinkner and Tyler, 2016). Yet the consensual route relies on citizens self-policing, and risks defection. This raises a question about the conditions in which citizens are likely to self-police and to comply with collective rules. Since the spread of SARS-CoV-2 (henceforth, coronavirus) in 2019, this question has been a major pre-occupation of governments across the world, for whom public compliance with rules around personal hygiene and social distancing represents – alongside a public immunization programme – the principal prophylactic in the fight against the coronavirus.

This study explores the role of a factor widely deemed to be central in encouraging citizens to comply with collective rules, namely political or institutional trust (henceforth ‘trust’). Trust is widely believed to be a central factor in stimulating individual compliance, yet its role during the current pandemic as well as in previous pandemics has sometimes been found to be limited. One reason for this is that trust is but one factor among many likely to shape compliance. When other factors are present and working to stimulate compliance, there may be less of a role for trust. Yet when other motivating conditions are weak or absent, trust may have more of an effect. This

suggests that the effect of trust on compliance might be contingent rather than absolute. In the context of the coronavirus, a particularly important motivating factor is likely to be individuals' fear of exposure to the virus and of contracting coronavirus disease 2019 (COVID-19). Fear may motivate individuals to comply with official rules largely irrespective of whether they trust government. Yet when fear is less widespread, compliance may depend more heavily on trust. These effects are likely to manifest at individual points in time and also over time. At the outset of the pandemic, public fear of the newly identified coronavirus and its effects was likely to have been high. These fears are likely to have stimulated individuals to comply with official restrictions without much need for them to trust the source of these rules. Yet as the pandemic progressed and people became more familiar with the coronavirus, anxieties are likely to have waned and public compliance to have become more dependent on trust.

This study explores the effects of trust and fear on people's compliance with official coronavirus restrictions over the duration of the pandemic. It extends previous analyses that have identified how fear moderates the effects of trust on compliance at single points in time by exploring how these relationships change over time. In so doing, it extends our understanding about how public compliance with important social rules can be maximized over the course of a crisis like a viral pandemic. The study also examines whether the role of trust in shaping compliance is particularly important for certain types of individuals. In particular, it explores whether the relationship between trust and compliance is most pronounced among people facing the highest costs of compliance. For such individuals, these costs are only likely to be internalized if they trust those responsible for official restrictions and rules. Among individuals for whom official restrictions are less costly, however, compliance is likely to be less dependent on trust. Overall, the study provides valuable new evidence about the association between trust and compliance, both over time and among particular social groups.

Trust and compliance with collective rules

The conditioning role of fear

Individuals comply with collective obligations for a variety of reasons. For the purpose of this study, two factors identified by Feldman (2013) are of particular relevance. The first factor comprises *instrumental* considerations and suggests that individuals comply with collective obligations primarily due to assessed costs and benefits. The costs include fear of punishment for non-compliance, including sanctions, financial penalties and, in the context of the coronavirus pandemic, infection from a harmful virus (Rosenstock, 1974; Brewer *et al.*, 2007; Bish and Michie, 2010; Cruwys, 2020; Dryhurst *et al.*, 2020). The second factor comprises *normative* considerations and suggests that individuals comply with collective obligations primarily due to the rule-making agency's perceived expertise (Feldman, 2013) and/or legitimacy and moral status (Tyler, 2006). On the normative account, compliance arises from individuals' beliefs that the source of official rules is knowledgeable and holds a compelling claim to obedience.

It is widely assumed that people's compliance with official rules is shaped by normative considerations, often involving assessments of official actors' trustworthiness (Bish and Michie, 2010; Bonell *et al.*, 2020; Habersaat *et al.*, 2020; van Bavel *et al.*, 2020; Cairney and Wellstead, 2021). Trust has been found to positively predict observance of official rules during previous viral pandemics (Blair *et al.*, 2017) as well as during the current coronavirus pandemic (Brodeur *et al.*, 2020; Olsen and Hjorth, 2020; Robinson *et al.*, 2021; Schmelz, 2021).¹ These findings have often arisen from studies employing a cross-sectional design, although longitudinal studies of compliance during the coronavirus pandemic have also highlighted a significant positive association with trust, at

¹Some analysts have suggested that trust may have a negative rather than a positive effect on compliance. On this account, high rates of trust are associated with perceived government effectiveness in dealing with a threat, which serve to reduce the incentive for individual compliance (Devine *et al.*, 2021; Wong and Jensen, 2020). However, the bulk of studies assume that trust is positively associated with compliance (although see Jennings *et al.*, 2021).

the individual level (Chan *et al.*, 2020; Wright *et al.*, 2021; Han *et al.*, 2021; Nivette *et al.*, 2021) and at the aggregate level (Bargain and Aminjonov, 2020). Moreover, specific distrust-inducing events – such as the breaking of official coronavirus rules by high-profile public actors – have been shown to correspond closely with declines in compliance rates among the public (Fancourt *et al.*, 2020).

Yet trust does not appear to have a consistently positive association with people's compliance with collective coronavirus rules. Some studies have found only a modest association, or no association at all, between individual trust and observance of official restrictions (Barrios *et al.*, 2020; Brouard *et al.*, 2020; Guglielmi *et al.*, 2020; Weinberg, 2020; Woelfert and Kunst, 2020). Other studies identify an association between trust and compliance in some countries but not in others (Travaglino and Moon, 2021). We can also point to countries – such as Singapore – whose citizens manifest high rates of political trust, yet whose rulers felt the need to impose strict coronavirus regulations when informal restrictions went ignored (Wong and Jensen, 2020). Conversely, countries such as Italy with low rates of trust experienced high levels of public compliance in the early stages of the pandemic (Guglielmi *et al.*, 2020).² A systematic review of public compliance with coronavirus measures found that, among the 19 studies exploring the role of trust in government, just five identified a positive impact on compliance, while three identified a negative impact and 11 no statistically significant impact (Kooistra and van Rooij, 2020: Table S2).

One reason for these varied findings is that analyses often differ in the account they take of factors that might confound the relationship between trust and compliance and which, if incorporated into empirical models, might weaken or eliminate the independent effect of trust. One such factor is fear of the coronavirus – an instrumental source of compliance – measured in terms of perceived personal or communal susceptibility to infection and/or illness. Indeed, some studies which model public compliance as a function of individual fear of COVID-19 have found that attitudes such as trust and respect for authority exert no significant independent effects on the outcome (Clark *et al.*, 2020; Harper *et al.*, 2020; Jørgensen *et al.*, 2021; Murphy *et al.*, 2020). These findings corroborate the results of data collected among Dutch citizens in 2009 during the H1N1 influenza pandemic, which showed that people's engagement with protective behaviour was predicted by their fear of the virus rather than by how much they trusted government (van der Weerd *et al.*, 2011).

We might use these results to incorporate measures of fear into our models of compliance, and more particularly to specify a conditional relationship between the core variables. In this conditional model, compliance rests primarily on fear or trust. Where fear is high there is less of a role for trust in stimulating compliance; yet where fear is low, trust may 'take up the slack' in encouraging compliance. Hence, compliance with COVID-19 rules is likely to be weakly associated with trust among individuals who are fearful of the coronavirus. Yet among less fearful individuals, compliance is likely to be more strongly associated with trust. Existing studies have corroborated these intuitions, showing that trust is associated with compliant behaviour particularly among individuals perceiving a low level of risk from the coronavirus. Among individuals perceiving

²For evidence drawn from a wider range of countries about the weak aggregate-level association between trust and compliance, see Petherick *et al.*, 2021. Such evidence may suggest that compliance is shaped more by institutional conditions – notably the enforcement of coronavirus rules – than by individual attitudes. In turn, the nature of rule enforcement may itself reflect underlying rates of trust among a population; for example, officials may impose strict enforcement to overcome anticipated weak compliance among a low trust population (Aghion *et al.*, 2010). Yet studies have shown that compliance with coronavirus rules is largely independent of individuals' fear of punishment given defection (Kooistra and van Rooij, 2020). It is thus unclear that institutional conditions, such as rule enforcement, have substantial independent or moderating effects on citizen compliance. In the current analysis, we cannot readily assess the effects of differences in rule enforcement between countries since, as we show in Appendix 4, the nature and timings of official restrictions in the three cases we study are broadly consistent.

a greater risk, compliance is less closely associated with trust (Jørgensen *et al.*, 2021; Lalot *et al.*, 2021; Kittel *et al.*, 2021a).³

To date, however, analysts have predominantly explored the conditional relationship between trust, fear, and compliance in a static perspective and by focusing on differences between individuals. Yet we anticipate the effects of trust and fear on compliance as likely to change over time, and it is these dynamics on which this study focuses. The factors associated with individual compliance with coronavirus rules have been shown to have shifted as the pandemic progressed (Wright and Fancourt, 2021), although little is known about whether the association between trust, fear, and compliance has altered over time. The primary purpose of this study is to fill this gap by identifying how the effects of trust on compliance conditional on fear have changed over the course of the pandemic.

Individual variation in the role of trust

One conditionality in the association between trust and compliance thus concerns the presence and role of other factors, notably fear. A second conditionality concerns differences between individuals. Here, we assume that the association between trust and compliance depends on the costs an individual faces from complying with official rules. This assumption draws on Hetherington's (2005: 49–50, 87–98) research, which shows that the effect of trust on people's agreement with government decisions varies according to the individual costs entailed by those decisions. Hetherington finds that trust is particularly closely associated with people's acceptance of official decisions where these entail high individual costs. In such cases, citizens will only internalize these costs if they trust officials to have taken the decision wisely and for good reason. In the context of the coronavirus pandemic, this intuition suggests that trust will be most closely associated with compliance among people for whom official restrictions are particularly costly or onerous. Among individuals less adversely affected by the restrictions, compliance is less costly and thus less likely to depend on trust.

Hypotheses

Two key hypotheses arise from the preceding discussion, relating to the association between trust and compliance (a) conditional on fear and (b) conditional on individuals.

The first hypothesis concerns the over-time effect of trust on compliance conditional on fear. *Ex ante*, we might expect fear to have been strongly associated with compliance at the start of the pandemic, since people's risk perceptions tend to be high when faced with a new, unknown threat (Slovic *et al.*, 2000). As threats become more familiar, people's perceptions of risk adjust (Sandman, 2012), suggesting that the association between fear and compliance might have declined over time. Assuming a conditional relationship between trust, fear, and compliance – such that at high levels of fear, the association between trust and compliance is weaker, while at low levels of fear, the association is stronger – we might expect waning levels of fear over time to be associated with a strengthened association over time between trust and compliance. In essence, as the association between fear and compliance lessens over the course of the pandemic, greater space opens up for trust, whose association with compliance is likely to strengthen. This suggests the following hypotheses about the dynamic relationship between trust, fear, and compliance:

³Trust and fear or anxiety may themselves be related. Anxiety among the population has been shown to trigger higher levels of trust (Albertson and Gadarian, 2015: ch4), including during the current coronavirus pandemic (Schraff, 2021). However, some studies have shown the link between perceived risk from COVID-19 and trust to be modest, and in many countries to be non-existent (Dryhurst *et al.*, 2020; although Schneider *et al.* [2021] find a clearer, negative, link between trust and risk perception). Irrespective, trust and risk are each likely to affect compliance, and our focus is on their association with this outcome rather than on their mutual relationship.

H1a: At the start of the pandemic, individual compliance was predominantly shaped by fear rather than by trust. H1b: As the pandemic progressed, the association between fear and compliance weakened, and the association between trust and compliance strengthened.

The second hypothesis concerns variation in the association between trust and compliance between individuals. In particular, based on differences in individual costs of compliance with official restrictions, we expect trust to be particularly strongly associated with compliance among individuals facing high costs, and less associated with compliance among individuals facing low costs. Compliance costs take various forms, although we assume these are primarily economic. We assume, in particular, that official restrictions are particularly costly for economically deprived individuals, many of whom found it difficult to comply with rules on staying at home and avoiding travelling to work (Templeton *et al.*, 2020).⁴ By contrast, compliance is likely to be less costly for affluent individuals who possess the financial reserves to cushion them from stay-at-home restrictions.^{5,6} This suggests the following hypothesis about the types of individuals for whom trust is likely to be particularly important for compliance:

H2: The association between trust and compliance will be greater for low economic status individuals than for high economic status individuals.

Data, measures and method

Data

These hypotheses are explored on populations in three west European countries: Austria, Germany, and the United Kingdom (UK). While a previous study found the associations between trust and compliance with COVID-19 rules to be largely consistent across countries (Jørgensen *et al.*, 2021), another study identified variations in these associations (Travaglino and Moon, 2021). Moreover, the finding of national invariance arose from a study conducted at a single point in time, towards the start of the pandemic. Given subsequent differences between countries in coronavirus infection and mortality rates, it makes sense to explore the association between trust and compliance across cases. Using the Oxford Supertracker, an online directory of population surveys on COVID-19 (Daly *et al.*, 2020), Austria, Germany, and the UK were identified as three of the few countries covered at the time by longitudinal surveys containing measures of all the key concepts.

The Austrian data derive from the Austrian Corona Panel Project (ACPP), which conducted surveys from late March 2020 (Kittel *et al.*, 2021b).⁷ Data were collected from an existing online

⁴Existing studies highlight some variation in the individual characteristics associated with general compliance measures (such as staying at home) and more restrictive rules (such as the requirement for self-isolation). In Britain, compliance with rules mandating staying at home and social distancing has been found to be more prevalent among low socio-economic households (Smith *et al.*, 2020; Fancourt *et al.*, 2021; see also footnote 21), while compliance with isolation rules has been found more prevalent among high socio-economic households (Smith *et al.*, 2021). Levels of homeworking, along with the ability to work at home, have been found to be greater among high income groups than among low income groups (Felstead and Reuschke, 2020; Ansell *et al.*, 2021; Atchison *et al.*, 2021), suggesting the costs of avoiding workplaces are lower for wealthier individuals.

⁵While governments in many countries have stepped in to support ‘furloughed’ workers, the financial cushion available to low-paid workers is still likely to be low, relative to high-paid workers. Hence, in spite of often generous levels of state support for workers, we anticipate the sacrifices involved in complying with official restrictions to have been greater for low economic status individuals than for high economic status individuals.

⁶Note that costs enter twice into individuals’ considerations about whether to comply with official coronavirus rules: first in terms of the risks (notably of infection and illness) of defecting from these rules, and second in terms of the cost (notably the financial ‘hit’ incurred) of observing these rules.

⁷See Bernhard Kittel *et al.*, ‘Austrian Corona Panel Project (SUF edition)’, Austrian Social Science Data Archive (AUSSDA) <https://doi.org/10.11587/28KQNS>

panel, among citizens aged 14 years and above, using a quota sample.⁸ The sample takes a panel format, with additional participants recruited at each wave to overcome attrition effects. Samples at each wave were ~1,500. The German data derive from the COVID-19 Snapshot Monitoring (COSMO) project, which conducted surveys from early March 2020.⁹ Data were collected from an existing online panel, among citizens aged 18 years and above, using a quota sample. Each wave comprises an independent cross section. Sample sizes at each wave were ~1,000. The UK data derive from the COVID-19 Social Study, which conducted surveys from late March 2020.¹⁰ Data were collected online, using convenience sampling and other targeted recruitment methods. The sample takes a panel format, with additional participants recruited at each wave to overcome attrition effects. Analytical samples at each wave vary in size from ~6,000 to ~38,000 participants.¹¹ Basic details of the methods employed by each country survey are provided in online Appendix 1.

To maximize comparability between the three cases, the analysis draws on data from the same number of waves (seven), stretching from April 2020 to February 2021, and selected to be broadly coterminous in timing (see Appendix 1). Individuals with missing data on any of the variables were excluded from the analysis. Post-stratification weights are employed on the Austrian and UK data (but are not available for the German survey) to correct for differential sampling and non-response rates.

Measures

Across the three national samples, similar, although not always identical, survey indicators were used to measure each of the central concepts. Question wordings are given in online Appendix 2, with descriptive statistics provided in Appendix 3.

Compliance is measured in the UK through a single question asking respondents whether they are following official recommendations to prevent COVID-19. Responses are recorded on a seven-point scale (1 = not at all, 7 = very much so). Compliance is measured in Austria and Germany through questions asking respondents about their behaviour over the past week in relation to wearing a protective mask when in public, keeping a distance from other people and staying at home except for necessities (Austria) or avoiding public places (Germany).¹² Responses were recorded on a five-point scale (1 = never behave in this way, 5 = always behave in this way). To test H1a/b, the responses to these three items are summed into a single compliance scale. To test H2 – which suggests that individual economic status is likely to moderate the effect of trust on compliance particularly when it comes to restrictions on travelling to work – the analysis employs the single item measuring whether people stayed at home (Austria) or avoided public places (Germany).

Political trust is measured through evaluations of national governments. In Austria, this is measured by a question on how much respondents trust the federal government ‘in the context of the corona crisis’.¹³ Responses were recorded on an 11-point scale (0 = no trust at all, 10 = a lot of trust). In Germany, the question asks how much trust respondents have in the government ‘that they are capable

⁸In the current study, all participants under 18 were dropped.

⁹Details of the COSMO survey may be found at: <https://www.psycharchives.org/handle/20.500.12034/2386>

¹⁰Details of the COVID-19 Social Study may be found at: <https://www.covidsocialstudy.org/>

¹¹From the end of August 2020, the COVID-19 Social Study switched from weekly to monthly data collection. The data drawn on here from October and December 2020 and February 2021 utilise weekly sub-samples of the monthly waves.

¹²There are well-known problems with using self-reports of compliance. Some studies suggest that reported rates of compliance with coronavirus restrictions closely approximate actual compliance rates (Larsen *et al.*, 2020; see also Kittel *et al.*, 2021a). Other studies find evidence of discrepancies between the two (Hansen *et al.*, 2021). Since the focus of this analysis is less on absolute rates of compliance than on trends in compliance over time and on variations in compliance between population sub-groups, we are less concerned by potential variation between reported and actual compliance rates. See also footnote 16.

¹³For wave 3 of the ACPP, trust was measured through a question on the state government, not the federal government. A later wave (wave 9) of the ACPP included measures of trust in both the federal and state governments. The response distributions to these two measures suggest a strong overlap in people’s trust, with 46 per cent of respondents providing the same response to the two measures, and 73 per cent providing a response that was the same or different by just one point (on an 11-point scale). The

of handling the new coronavirus well and properly'. Responses were recorded on a seven-point scale (1 = very low trust, 7 = very high trust). While in Austria the prime responsibility for dealing with the coronavirus pandemic rests with the federal government, in Germany this responsibility lies with the state governments (*länder*), although the federal government is closely involved in decision-making (Hegele and Schnabel, 2021). Consequently, when it comes to Germany, we anticipate that trust in the federal government will be important for public compliance, although we also explore the role of people's trust in the state government. In the UK, respondents were asked about their 'confidence' in the UK government 'that they can handle COVID-19 well'. Responses were recorded on a seven-point scale (1 = none at all, 7 = lots).¹⁴

Fear of COVID-19 is measured in Austria by respondents' estimate of the health hazard posed by the coronavirus to them personally and, separately, to the nation as a whole. Responses were recorded on a five-point scale (1 = very small, 5 = very large). Fear is measured in Germany by questions on the likelihood of infection ('What do you consider to be your own probability of getting infected with COVID-19?'; seven-point response scale, 1 = extremely unlikely, 7 = extremely likely) and the consequences of infection ('How severe would contracting COVID-19 be for you [how seriously ill do you think you will be]?'; seven-point response scale, 1 = not severe, 7 = very severe). Responses to the two questions were multiplied together to create a 'risk' variable.¹⁵ In the UK, fear is measured by a question on whether 'catching COVID-19' and 'becoming seriously ill from COVID-19' were sources of worry over the past week (binary 'yes/no' response categories). Responses were combined to create a three-point (0 = no worry, 1 = some worry, 2 = very worried) risk scale.

Socio-economic status is measured by self-reported household income (measured monthly in net form in Austria and Germany; measured weekly or annually in the UK). In Austria, income was measured on a 10-point scale, in Germany, income was measured on a seven-point scale, while in the UK income was measured on a six-point scale. We retain these interval scales in our models (running from low income to high income), since measuring income in binary form would raise the question of where to draw the dividing point.

Our empirical models also control for demographic features identified in previous studies as shaping compliance with health-related behaviours (e.g. Bish and Michie, 2010; Wright and Fancourt, 2021; Kooistra and van Rooij, 2020) and which are also frequently found to be associated with trust, namely age, education, and gender. Age is particularly important, since older people are more vulnerable to illness and mortality after contracting COVID-19.

Method

The association between trust and compliance conditional on fear (H1a/b) is analysed in two ways. The first uses individual survey waves to identify associations at particular points in time. The second uses data pooled across waves to identify the effects of trust and fear on compliance over the course of the pandemic. In the German case – where the data represent repeated cross sections of the population – dynamic effects are identified by fitting time interaction terms to the key variables. The pooled models fitted to the Austrian and UK data take advantage of their panel structure by specifying fixed-effects equations, which enable identification of the effects of time-variant factors – namely trust and fear – while eliminating the effects of potentially confounding time-invariant factors, such as demographic characteristics. The variation in levels of trust and fear over the period (see Figure 1) means that fixed-effects models are likely to provide efficient

correlation between responses to the two trust measures was 0.79. Given these similarities, we treat trust in state government as a good proxy for people's trust in the federal government for the purposes of measurement in wave 3.

¹⁴Since political trust is often shaped by individuals' party support, ideally we would have measured – and controlled for – partisanship. Unfortunately, no measures of partisanship were included in the German and UK surveys.

¹⁵This approach reflects the twin components of risk: the probability of a risky event occurring and the level of harm presented by the event (Breakwell, 2020).

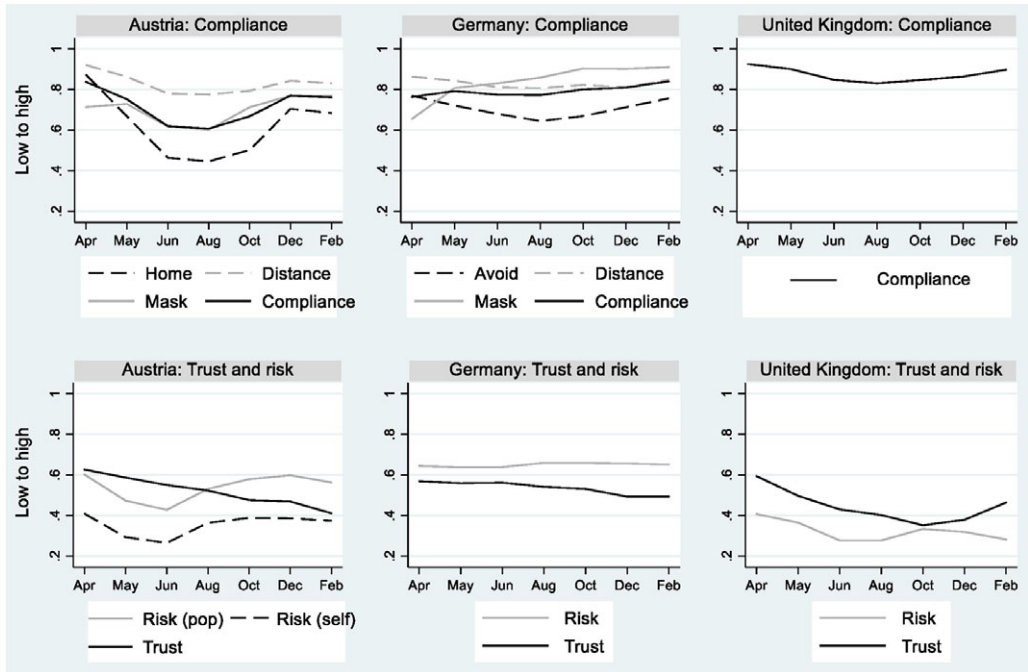


Figure 1. Trends in key variables.

estimation of relationships (Allison, 2009). Since we are concerned to identify temporal trajectories in our core relationships – which we anticipate being subject to fluctuation, given changes in infection and mortality levels and associated shifts in official restrictions (online Appendix 4) – the fixed-effects models include time interaction terms.

When it comes to gauging the effects of trust on compliance among different economic status individuals (H2), cross-sectional models are employed using data from individual waves and pooled across waves. All data are normalized, to facilitate comparisons between countries.

Results

Distributions on the three key variables – compliance, trust, and perceived risk – over the eleven months from April 2020 are set out in Figure 1. When it comes to compliance, in Austria there is a dip immediately after the onset of the pandemic and the lockdown in March 2020, before a pickup from late summer. A similar U-shaped pattern of compliance is evident in the UK, and in Germany with the exception of mask-wearing (which increases over time). These trends broadly match changes in the nature of official restrictions (Appendix 4).¹⁶ In the case of perceived risk, Austria and the UK see a decline immediately after the pandemic’s start, before levels of risk pick up from late summer and autumn. Levels of perceived risk in Germany are more stable over time. When it comes to trust in government, there is a stark decline in each country, although a pickup at the end of the period in the UK.¹⁷

¹⁶These trends fit the patterns obtained from self-reported behaviour across a wider range of countries and from actual behaviour gleaned from cell phone mobility data (Petherick *et al.*, 2021).

¹⁷Across the three countries, levels of trust may have declined from an artificially high level at the pandemic’s outset, triggered by an initial ‘rally’ effect towards government (Bol *et al.*, 2021; Esaiaasson *et al.*, 2021). The increase in trust in the UK government at the end of the period probably reflects the mass rollout of the COVID-19 vaccination.

At the outset of the pandemic, then, governments in each country were presented with auspicious conditions for encouraging compliance with official restrictions: high levels of both trust and perceived risk among their populations. However, as the pandemic developed, people's trust in government fell while, in Austria and the UK, the perceived risks of the coronavirus initially declined, before increasing from summer and autumn 2020.

To identify the effects of these factors on compliance, and in particular the effects of trust at different levels of fear, identical regression equations are fitted to the data from each country for each of the seven survey waves. The full results from these equations are shown in online Appendix 5. The key result relates to the interaction of trust and fear. In each country, and across almost all waves, this term yields a negative coefficient indicating that the effect of trust on compliance declines as individuals' perceptions of risk increase.¹⁸ To examine the separate effects of trust and fear on compliance over time, identical cross-sectional equations (omitting the interaction terms) are fitted to the data. The results (see online Appendix 6) show that, in Austria and the UK, the association between fear and compliance strengthened somewhat from spring 2020. The association between trust and compliance in both countries, and between both variables and compliance in Germany, remained broadly consistent over the period. There is little evidence from these repeated cross-sectional models that the effect of fear on compliance has waned over time.

To more robustly identify over-time changes in the effects of trust and fear on compliance, we pool observations across waves. The results from fixed-effects (Austria and UK) and ordinary least-squares (Germany) models are shown in online Appendix 7 and in graphic form in Figure 2.¹⁹ The graphs highlight differences between countries both in the magnitude of the associations between trust and compliance and fear and compliance, and in the changes of these associations over the course of the pandemic. The German data suggest little obvious strengthening or weakening in the associations between trust and compliance and between fear and compliance; instead, we see trendless fluctuation in these associations. Yet the data from Austria and the UK – which represent within-individual change – provide clearer evidence of a strengthening association between trust and compliance, particularly during the pandemic's early stages (April–June 2020). In Austria, within-individual increases in trust between April and June were associated with an 8.9 percentage point increase in compliance (the predicted probability of compliance associated with an increase in trust over the period rose from 0.02 to 0.11); the equivalent figure for the UK sample was 5.4 percentage points. The stronger association between trust and compliance does not arise, however, from a weakening association between fear and compliance. In fact this association also strengthened during the early stages of the pandemic, particularly in Austria.²⁰ Here, within-individual increases in fear between April and June 2020 were associated with a 16.4 percentage point increase in compliance; the equivalent figure for the UK sample was 2.3 percentage points.

Overall, the results from both between-individual (Germany) and within-individual (Austria, UK) analyses do not suggest conditionalities in the effects of trust and fear on compliance over time; indeed, across the three countries, the dynamic effects of trust and fear on compliance appear fairly similar. We find no evidence that compliance was initially driven more by fear than by trust or that increases in the association between trust and compliance over time arise from weaker associations between fear and compliance.

We now turn to examine the conditionalities of trust between individuals, in particular between people facing different costs of compliance. We explore these conditionalities through repeated

¹⁸Among the German sample, a similar association with compliance conditional on risk is found if trust is measured in relation to the state government rather than the federal government (this finding is based on data from wave 35, which was the only wave fielding a question on trust in the state government).

¹⁹The results of two-way fixed-effects models for Austria and the UK are shown in Appendix 8.

²⁰The results for the Austrian sample in Appendix 7 cover both personal risk and social risk; since the results are similar across both types of risk, the graphic limits the results to personal risk.

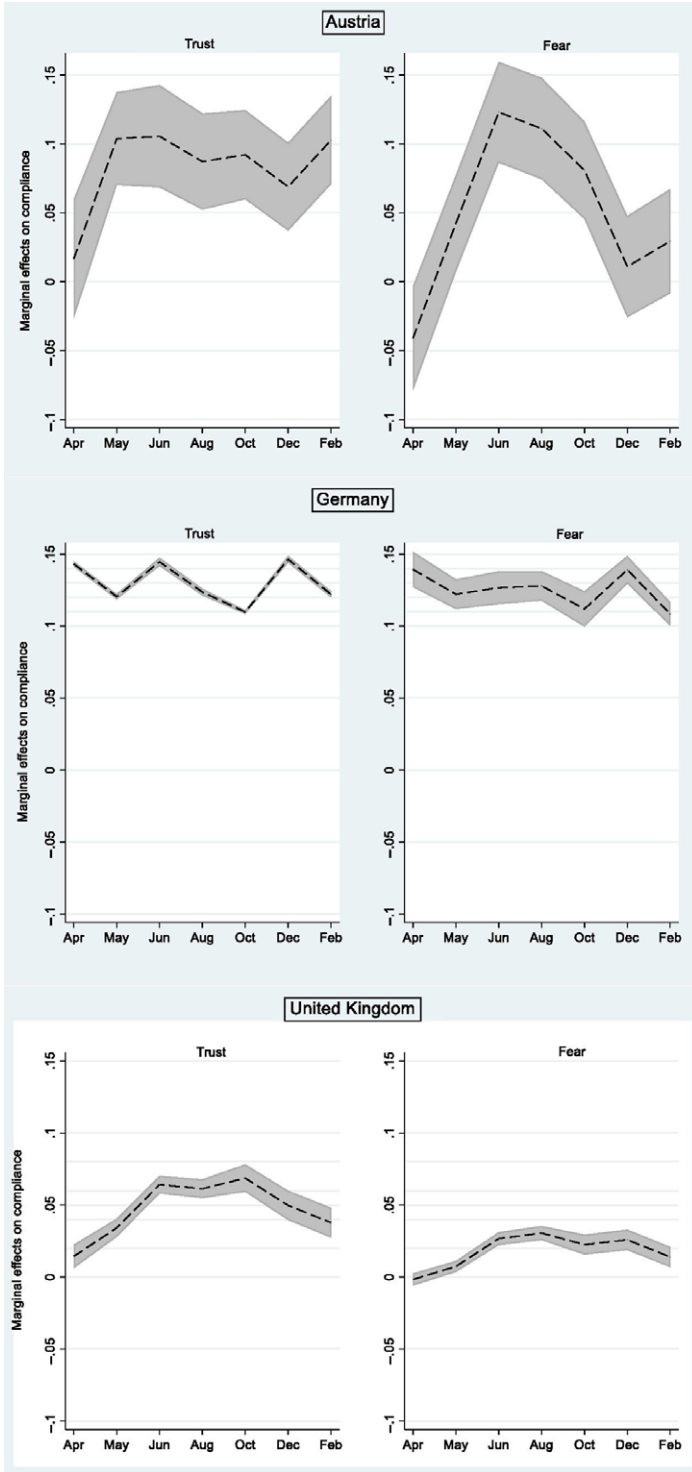


Figure 2. Association of trust and fear on compliance, over time. Note: Dotted lines show marginal effects from regression models in Appendix 7. Grey area indicates 95% CIs.

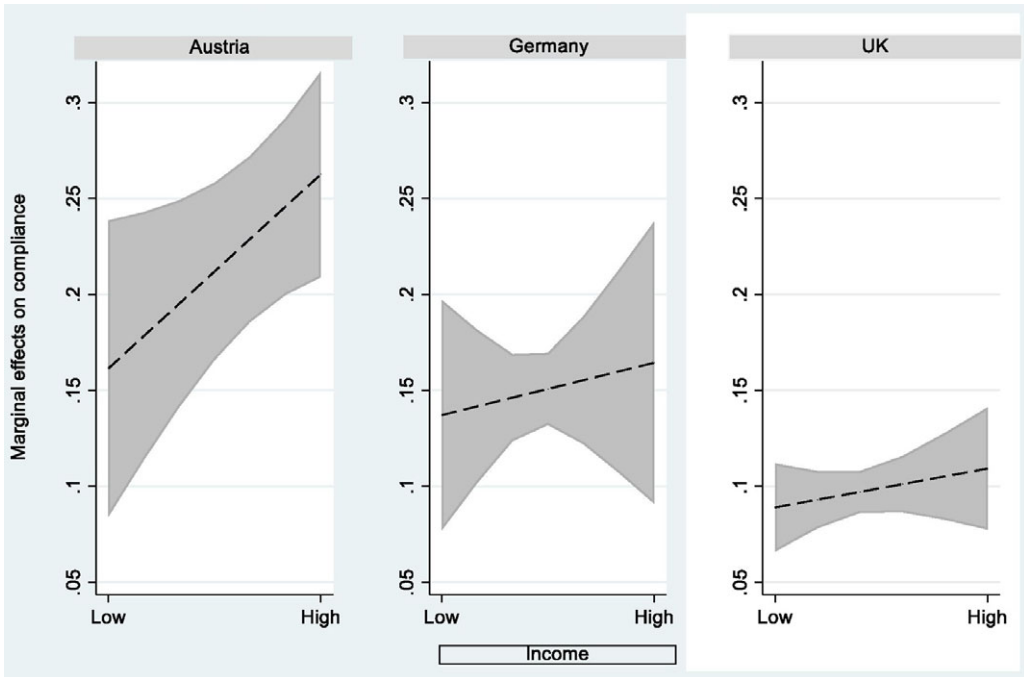


Figure 3. Effects on trust on compliance, by income.

Note: Dotted lines show marginal effects derived from regression models in Appendix 9. Grey areas indicate 95% CIs.

cross-sectional models, in which individual socio-economic status (measured by household income) serves as the key moderator. The results from these models are laid out in online Appendix 9. H2 anticipated that the interaction term for *trust* \times *income* would be negative, indicating a stronger association between trust and compliance at low, than at high, levels of household income. In Austria, however, the relevant coefficients are all positive, although only in three of the seven waves do they achieve statistical significance ($p < 0.05$). The equivalent coefficients from the German and UK data are more mixed. Fitting the equations to data pooled across waves (Appendix 9, final column) shows that, in all three cases, the relationship between trust and compliance strengthens at higher levels of household income (Figure 3), although only in the Austrian case is the effect statistically significant ($p < 0.05$).

To confirm this result, we employed different indicators of economic status to proxy compliance costs. The first indicator involved employment security; in Austria, this was measured through respondents' assessed likelihood of losing their job, while in Germany and the UK this was measured through respondents' worry about losing their job. The second form involved financial hardship; in Austria, this was measured through respondents' assessments of their household finances in three months, while in the other two countries this was measured through respondents' worry about running into financial difficulties (Germany) and about their finances (UK).

The results from models incorporating these alternative indicators of economic status (reported in online Appendix 10) are somewhat mixed. In the job insecurity models, the across-wave interaction term with trust is positively signed in Austria, although negatively signed in Germany and the UK (none of the coefficients is statistically significant at $p < 0.05$). The financial concern models show a positive cross-wave interaction term with trust in Austria (significant at $p < 0.05$), suggesting that trust is more closely associated with compliance among financially optimistic, not financially pessimistic, individuals (the coefficient for the German sample is also

positive, although not statistically significant). Among UK citizens, however, the interaction term is negatively signed (significant at $p < 0.05$), suggesting that trust is more closely associated with compliance among financially concerned individuals. These results are somewhat uneven yet, with the exception of the UK result on financial concern, they provide little clear evidence of trust being most closely associated with compliance among people facing the greatest economic cost from official restrictions.²¹

Discussion

Numerous studies have explored which factors shape individual compliance with collective obligations at particular points in time. Less scholarly attention, however, has been paid to the effects of these factors over the course of a crisis like a viral pandemic. This study has sought to fill this gap by exploring how changes in two key factors – political trust and fear – are associated with changes in compliance across the course of the coronavirus pandemic among three national populations. We hypothesized a ‘substitutability’ effect for these two factors: at the outset of the pandemic, high levels of fear would do much of the work in motivating compliant behaviour, leaving less of a role for trust. As the pandemic progressed and people became accustomed to the coronavirus, fear would do less work in motivating compliance, allowing trust to ‘take up the slack’.

At particular time points, this substitutability effect is exactly what we find. High levels of fear among individuals are associated with weaker associations between trust and compliance. Yet when we move to a dynamic picture, the substitutability of trust and fear on compliance is less evident. At the very least, in the case of Germany, the associations between trust, fear and compliance increase and decline in parallel rather than diverging. And in Austria and the UK – where the data allow more rigorous modelling of within-individual variation – we find that increases in both trust and fear have become more strongly associated with compliant behaviours, at least in the early stages of the pandemic. The strengthened association between fear and compliance identified in Austria and the UK accords with a similar exercise conducted on a sample of the British population, which found a close link between perceived risk and compliance as the pandemic progressed (Schneider *et al.*, 2021). What our study shows, in addition, is that this increased over-time effect of fear on compliance does not co-exist with a decreased over-time effect of trust on compliance. On a longitudinal perspective at least, fear of the coronavirus does not appear to crowd out the stimulating role of trust.

Trust is widely seen as an important consideration for individuals in deciding whether to comply with official rules, particularly where these entail significant individual costs. Our findings partly confirm the first intuition while casting doubt on the second. In particular, we find little empirical support for the hypothesis that trust is most associated with compliance among individuals for whom staying at home involves high costs. Although the results provided by different measures of economic status are not wholly consistent, those obtained from income suggest that trust may be most closely associated with compliance among people facing the lowest, not the highest, financial costs from coronavirus restrictions. It would be valuable to study these relationships across different countries, across different forms of compliance and utilizing different measures of compliance costs (by examining behaviour among people who occupy confined living areas or who have out-of-home care duties, for example).

Conclusion

Individuals comply with official restraints on their actions for a number of reasons. Among these, trust is an important contributory factor. Yet as previous studies have shown, trust may play less of

²¹Results of models of the main effects of household income, job security and financial concern on compliance are available from the first named author.

a role in stimulating compliance when people hold more instrumental reasons for abiding by collective rules, notably fear – for themselves and for wider society – of the consequences of defecting. This suggests that governments which fail to command public trust may, nonetheless, secure high rates of public compliance if individuals are sufficiently fearful of a social threat. In the countries studied here – Austria, Germany, and the UK – levels of compliance among the population maintained or even rose between 2020 and 2021 in spite of declining aggregate levels of trust. This suggests that factors like fear may indeed be doing much of the ‘heavy lifting’ in sustaining pro-social forms of behaviour among the population. Over the period, however, we have shown that increases in compliance arising from individual feelings of fear do not diminish the effects of individual feelings of trust, which also appear to boost compliance. This testifies to the importance of public trust in government in the event of a social threat like a viral pandemic. The importance of trust also applies to other forms of compliance, notably to people’s receptiveness to official recommendations about the coronavirus vaccination (e.g. Lazarus *et al.*, 2020). People may behave in socially optimal ways out of an instrumental concern for the consequences of not doing so. Yet they also comply because, in more normative terms, the source of collective rules is deemed trustworthy. Over the course of a crisis like the coronavirus pandemic, public compliance with official rules arises not only from the severity of social threats, but also from the perceived qualities of collective rule-makers.

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Data availability. The Austrian and German data employed in this analysis are publicly available; details are provided in the footnotes. The UK data are not publicly available; but details of the data are provided in the footnotes.

Competing interests. The authors declare none.

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